**448. Proposed by S. W. REAVES, University of Oklahoma.**

Through a given point $P$ within a given angle to draw a line which shall form with the sides of the angle a triangle of a given area [Well's *New Plane Geometry*, (1909), p. 153].

## CALCULUS.

Solutions of 352, 354, 355, 356, 357, 358, 359, 361, 362, and 366 have been received. Solutions of 332, 337, 339, 340, 342 are desired.

**368. Proposed by PAUL CAPRON, Annapolis, Md.**

Develop $\log_{10}(x/\sin x)$ and $\log_{10}(\tan x)/x$, each to three terms, as functions of $\log_{10}\sec x$ and show that if $x$ is less than 7° 15′ then, to five decimals,

$$\log_{10} x = \log_{10}\sin x + 1/3\log_{10}\sec x = \log_{10}\tan x - 2/3\log_{10}\sec x.$$

**369. Proposed by I. A. BARNETT, Chicago, Ill.**

Compute the definite integral $\int_a^b \log x dx$ by direct summation.

## MECHANICS.

Solutions of 288, 289, 292, 293, and 294 have been received. Solutions of 268, 269, 274, 275, 277, 278, 279, 286, and 287 are desired.

**296. Proposed by C. N. SCHMALL, New York City.**

A force $F$ is exerted in moving a horizontal cylinder up an inclined plane by means of a crowbar of length $l$. If $R$ be the radius of the cylinder, $W$ its weight, $\phi$ the inclination of the plane to the horizon and $\psi$ the inclination of the crowbar to the horizon, show that

$$F = \frac{WR\sin\phi}{l[1+\cos(\phi+\psi)]}.$$

**297. Proposed by C. N. SCHMALL, New York City.**

A shrapnel shell strikes the ground and then explodes, dispersing its fragments in all directions with a common velocity $v$. If $A$ be the area of the ground covered by the fragments, and if the dimensions of the shell be neglected, show that $A = \pi v^4/g^2$.

## NUMBER THEORY.

Solutions of 207, 210, 212, 216, and 218 have been received. Solutions of 189, 191, 192, 196, 200, 205, 208, 209, 211, 213, 214, and 215 are desired.

**220. Proposed by E. T. BELL, Seattle, Washington.**

Let $[m/n]$ denote the greatest integer that is not greater than $m/n$; and let the two sets,

$$\left[\frac{m}{m-1}\right]; \left[\frac{m+1}{m-2}\right]; \left[\frac{m+2}{m-3}\right]; \cdots; \left[\frac{2m-3}{2}\right],$$

$$\left[\frac{m-1}{m-1}\right]; \left[\frac{m}{m-2}\right]; \left[\frac{m+1}{m-3}\right]; \cdots; \left[\frac{2m-4}{2}\right],$$

be denoted by $(A)$ and $(B)$ respectively.

Prove that a necessary and sufficient condition that $2m-1$ be a prime number is that the excess of the number of even integers in $(A)$ over the number of even integers in $(B)$ shall be equal to the excess of the number of odd integers in $(A)$ over the number of odd integers in $(B)$.

**221. Proposed by THOS. E. MASON, Bloomington, Indiana.**

Find numbers $x$ such that the sum of the divisors of $x$ is a perfect square [Carmichael, *Theory of Numbers*, p. 17].